Presentation to Montana Sage-grouse Habitat Conservation Advisory Council

August 13, 2013

Bob Green

Shrub reclamation; award-recognized

Shrub establishment outreach

Successful shrub establishment on reclaimed lands

Cloud Peak Energy Antelope Mine Shrub Establishment Project

Recipient of the 2010 National Excellence in Surface Mining and Reclamation Award from the Office of Surface Mining

Introduction

The Antelope Mine, operated by Antelope Coal LLC and owned by Cloud Peak Energy Resources LLC, is an active surface coal mine located in northeastern Wyoming. Antelope Mine uses a multiple seam, surface mine operation covering 14,320 acres using an open-pit dragline operation with truck-shovel assist. In 2010, Antelope Mine produced nearly 36 million tons of coal.

Antelope Mine has developed a procedure to consistently restore shrub habitat from seed through a three-phase approach. Through this approach, the mine has planted and maintained a number of different native shrub species using landform design and target seeding technology that has resulted in high quality wildlife habitat that is often better than the pre-mining baseline condition. This poster describes Cloud Peak Energy's unique approach to accomplishing shrub establishment on reclaimed land.

Background

Shrub establishment from seed has been a challenge for the mining industry. Achieving consistent results year after year on reclaimed surfaces in the Powder River Basin has been elusive. Native shrubs have specific habitat preferences and germination requirements, with poor germination rates (between 10% and 15%). They are physically difficult to handle because of small seed size and the high percentages of impurities in commercially available seed supplies.

The Wyoming Department of Environmental Quality has set specific performance requirements for shrub establishment of 1 shrub per square meter on 20% of lands affected by coal mines. Because shrubs are considered winter forage for sage-grouse, mule deer, antelope and other wildlife, and they also create micro habitats for multiple flora (e.g., forbs) and fauna (e.g., sagebrush obligate species), Cloud Peak Energy sought to improve shrub establishment beyond regulatory requirements.

The Antelope Mine program was initiated in 2005.

Methodology

Antelope Mine incorporated a three-phase approach to improve shrub establishment success on reclaimed lands.

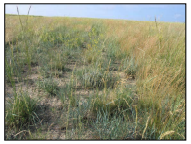
Phase 1: Careful evaluation of macro scale post mining topographic surfaces to identify land areas with the highest shrub establishment potential.

Phase 2: Use of micro topographic features such as basins, ridgeline breaks and designed rock structures (natural snow fences) to enhance moisture collection and improve deep soil moisture conditions for deep-rooted perennial shrub species.

Phase 3: Use of advanced planting technology to target optimal planting dates, planting conditions, timing and rates of 9 to 11 pounds pure live shrub seed per acre, and use of specialized seed drilling equipment.

The custom Brillion seeder works efficiently to seed large areas of land in a short period of time due to larger openers and higher speed gearing. This allows the Antelope Mine to take advantage of limited seeding weather windows during the winter months and improve cost effectiveness.

Testing the methods for range of applicability, Antelope Mine focused on a different shrub species in each planting year using the same planting techniques. All reclamation units were seeded during severe drought conditions. Seeding techniques were designed to simulate the phenology (high volumes of low quality seed) of the sagebrush species.



Seeded reclaimed land with successful shrub plants at Antelope Mine. Antelope Mine seeds during warm days from December through February, focusing on very shallow thawing of otherwise frozen ground conditions to help regulate seeding depth and expose the shrub seed to a cold cycle and improve germination rates.

Results

Antelope Mine has demonstrated that it is possible to produce a consistent crop of different shrub species even during drought years. Antelope Mine successfully targeted and planted five shrub species that will meet or exceed regulatory standard and goal requirements for shrub density and area coverage.

Findings from all five shrub reclamation sites exceeded the regulatory requirement of 1 shrub/m^2 on 20% of disturbed lands, with the exception of one reclamation unit. On that unit, subsequent interseeding efforts established three shrub species and improved the overall diversity to meet and exceed the standard.

Reclaimed shrubs: dominant species, densities, heights

Dominant species	Year of shrub seeding	Shrub density (shrubs per m^2) at 2009	Mean shrub height (cm) at 2009
Area 1: Big sagebrush & fringed sage	2005	1.2	13.3 – 14.7
Area 2: Winterfat	2007	1.4	14.0
Area 3: Black greasewood	2006	1.4	17.5

The success of these reclamation units is largely attributed to landform selection of the target sites (areas accumulating water reserves), coupled with timing of seeding (December to February) and drilling technique (use of a Brillion seeder).

Elk utilize reclamation shrubs, such as these greasewood plants, for forage, cover and as antler rubs with the onset of the rut. Big sagebrush, fringed sage, greasewood and winterfat provide critical forage and protective areas during the winter months for elk, mule deer, and antelope. Native stands are associated with deeper more developed soil profiles, cooler soil conditions (slope and aspect) and areas that drift snow and accumulate deep water reserves. Four-wing saltbush has been easier to establish and often acts as an interim species for developing sagebrush stands. Big sagebrush, fringed sage, greasewood, winterfat and four-wing saltbush have all been established on reclaimed lands using the three-phased approach.

Long-Term Benefits

The specifics of the three-phased shrub establishment strategy can be applied throughout the Powder River Basin and elsewhere in the sage brush steppe. The use of these strategies will improve the ability to establish or improve habitat for wildlife species, improve species diversity on reclaimed lands and meet or exceed applicable shrub establishment standards for coal mines. Reclamation stands with developed shrub communities create a more diverse landscape and improve important winter habitat for numerous wildlife species.

These benefits include the means to improve habitat for greater sage-grouse, a candidate species for Federal listing under the Endangered Species Act by the U.S. Fish and Wildlife Service. The reclamation efforts at the Antelope Mine demonstrate Cloud Peak Energy's voluntary commitment to provide diverse and high quality reclamation and to enhance the science of mine land reclamation.

Special Presentations

Cloud Peak Energy will be presenting this information at the Antelope Mine on May 19, 2011.

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Cheatgrass control
Award-recognized

Fence removal for sage-grouse

Arch Coal example of Fence removal in sagebrush habitat/lekking area for grouse at Coal Creek Mine

Offsite mitigation potential
Conifer removal – understory improvement

Active industry participation in TBGPEA Sage-grouse related projects

- Cooperative industry funding of:
  - Chemical treatments of cheatgrass
  - S-G collaring and tracking for habitat use studies
  - Detailed lek monitoring (cameras)
  - Windmill replacements with solar units
  - Aerial mapping of shrub habitats in NE WY
- Development of conservation measures for S-G and other species
- Subsidized reduction in grazing intensity to increase quality-quantity of understory

Industry funding participation in USFS and NRCS S-G projects

- Treating conifer encroachment in sage-grouse habitat in SE MT
- S-G collaring and tracking to determine relative use of cheatgrass treated areas in NE WY – ongoing
- Shrub mapping in NE WY
- Sage-grouse habitat improvement in NE WY

Other ongoing measures

- **Installation of wildlife escape ramps in water tanks**
- **Use of solar panels in lieu of overhead power for:**
  - Air monitoring stations
  - Electric fences
- **Monitoring**
- **Formal grazing plans for lessees on industry-owned surface**
- **Special reclamation for forb species**

Habitat Recovery & Replacement Plans

Example HRRP actions at Spring Creek Mine 2012-13

- 7 miles unused fence removed from s-g habitat
- ~3 miles of wildlife design fence constructed
- Grazing lessee agreements for pasture rotation plans
- $13,000 funding for Landowner Incentive Program
- Facilitating discussions agencies-landowners
- Larvicide treatments of water catchments
- Currently 225 acres of reclamation interseeded with WY big sagebrush - ongoing
- Reclaiming 525 acres of premine pastureland to sagebrush grassland
- Initiated study of mechanical treatment options to enhance decadent shrub/habitat areas